On the same page a probable injustice is done to the instrument, for we find that "in all cases the observation must be often repeated to obtain results of any value." What can be meant by the statement on p. 198, that the octahedron, or unit pyramid, is always the largest, and the cube rectangular prism, or pinakoid the smallest, of the constituent forms of any combination? On p. 205 we learn that density and hardness are common to all solids alike, and are therefore *independent of structure.* A definition (p. 212) informs us that a substance is *ductile* when it can be cut with a knife, but crushes to powder under a hammer, copper pyrites being cited as an example; and on the same page we find as an illustration of toughness of a mineral that "Malleable native Copper, especially when intimately mixed with siliceous vein-stuff and some varieties of Hematite and Iron Pyrites, has the property of toughness in a high degree."

The discussion of the optical properties is more unsatisfactory still. On p. 225 is to be found the following remarkable statement:—

"The movements in such a medium can only be reduced to order by supposing them to be made up of portions of homogeneous substances of different properties, and treating each one separately."

The proof of the existence of a minimum angle of deviation as submitted on p. 233 can scarcely be meant as serious; but to this curious proof should not have been appended an erroneous translation of the formula into words. On p. 235 the azimuths of vibration of an ordinary ray of light are said to change *continuously*, but so very rapidly that the changes are not perceptible to the eye; on the following page we read of "impulses having different velocities." Perhaps matters reach a climax about p. 245, where the intelligibility of the book for a brief period suffers total eclipse, as perhaps may be imagined when we read that "these orthogonal *forces* are called the *axes* of optical elasticity." On p. 263 one of the rays produced by double refraction is said to be "an extraordinary ray in all directions but those of the optic axes." Phosphorescence is, according to p. 290, "the power of emitting light in a dark place." On p. 293 we find a serious misapprehension as to the precise nature of the method employed by Fizeau for the determination of the expansion of crystals. One infers from the explanation here given that the interference rings, produced by help of a plane crystal surface and a lens, are *distorted* on change of temperature, and that the measurement of this distortion serves for the determination of the coefficient of dilatation for different directions in the plane surface; as a matter of fact Fizeau by his method determined with each crystal section the dilatation in only *one* direction, namely, that normal to the plane surface.

It is difficult to understand how Mr. Bauerman has contrived to allow so many loose statements to creep into his book; and we can only surmise that he has himself not had the time or the opportunity for a careful revision of the proofs. At any rate it will be evident from the above that a careful revision is absolutely required before the book can take its proper place in mineralogical literature. We trust that the present edition may be speedily disposed of, and that Mr. Bauerman will thus be enabled to offer to the English student a second and revised edition of a work, the want of which is urgently felt by every teacher of the subject. L. FLETCHER

A TREATISE ON CHEMISTRY

A Treatise on Chemistry. By H. E. Roscoe, F.R.S., and C. Schorlemmer, F.R.S., Professors of Chemistry in the Victoria University, Owens College, Manchester. Vol. III. The Chemistry of the Hydrocarbons and their Derivatives, or Organic Chemistry. Part I. 8vo. (London: Macmillan and Co., 1881.)

THE term "Organic Chemistry" was originally used to denote the chemistry of compounds produced in the living vegetable or animal organism, all of which contain the element CARBON. For a long time indeed it was supposed that these compounds were peculiarly the products of living organisms, being formed under the influence of a so-called *vital force*, and that they could not be produced, like those of the mineral world, by artificial means. But the course of research has shown that this idea was erroneous, and that a large number of the more important organic bodies—hydrocarbons, alcohols, acids, &c., originally known only as products of the living organism—can be formed synthetically from their ultimate elements. The name "Organic Chemistry" has thus acquired a new signification, and in its widest sense is now used to denote the chemistry of carbon-compounds. As however some of these compounds, viz. the oxides and sulphide of carbon, have long been known to be producible by direct combination of their elements, and have accordingly been described in Manuals of Chemistry amongst inorganic compounds, the authors of the present treatise have thought it desirable to use the term "Organic Chemistry" in a somewhat narrower sense, viz. as signifying the CHEMISTRY OF THE HYDROCARBONS AND THEIR DERIVATIVES.

The volume commences with a historical sketch of the development of this department of the science, tracing it from the few facts respecting organic bodies known to the ancients, to the discoveries of Scheele, Lavoisier, Berzelius, Liebig, and numerous other workers, down to the present time—dwelling especially on the idea of Compound Radicals introduced by Lavoisier, and further developed by Berzelius, and by Liebig and Wöhler in their classical research on Bitter Almond Oil and its Derivatives, published in 1837—thence to the theories of Substitution and Types, founded chiefly on the researches of Dumas, and of Laurent and Gerhardt, and to the subsequent fusion of the Radical and Type theories brought about by the experiments of Williamson on Etherification, and those of Wurtz and Hofmann on the Compound Ammonias.

The next division of the work treats of the methods of ORGANIC ANALYSIS, which are explained in considerable detail, and illustrated by admirable diagrams; also of the determination of Vapour-density, in which the latest methods introduced by Victor Meyer are fully described, after which we come to the Determination of Molecular Formulæ, the explanations of which are characterised by singular clearness.

Next follows the CLASSIFICATION OF CARBON-COMPOUNDS, which are divided into groups according to the mode of linking of the carbon-atoms, the principal divisions being the Fatty or Paraffin group, in which the carbon-atoms are joined together in a single open chain, and of the Aromatic or Benzene group, in which the

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atoms are supposed to form closed chains. Objections have sometimes been raised against this division as somewhat arbitrary; but we cannot help thinking that it is justified by the peculiar kind of isomerism, depending on the relative position or "orientation" of the substituted groups or radicals which exists amongst benzene derivatives.

The formation, constitution, and general properties of the Paraffins are next explained, together with those of the several groups of bodies, Alcohols, Acids, Amines, &c., derived from them by substitution, and the remainder of the volume is devoted to the special description of these several compounds, which are arranged according to the number of carbon-atoms contained in them, beginning with the lowest or Methyl-group, the fundamental hydrocarbon or paraffin of each group being first described, and then in succession the Alcohols, Ethers, Nitrogen-bases, Phosphorus-bases, Organo-metallic compounds, Aldehydes, Acids, Ketones, Sulphur-compounds, &c., derived from it.

All these compounds are clearly and ably discussed, especial attention being given to those which are of industrial importance, *e.g.* common Alcohol, Acetic Acid, and the Higher Acids of the Fatty series, which enter into the composition of soap. Several industrial processes are described in considerable detail, and amply illustrated by figures, *e.g.* the separation of the Paraffin-oils by fractional distillation, the manufacture and rectification of Alcohol, the testing of the strength of Spirits and of Wine and Beer, the preparation of Vinegar, and the manufacture of Soap. And here perhaps it may not be out of place to point out the great practical importance of Organic Chemistry, which, strange to say, has been called in question by some writers in the periodical press, who have spoken of it as consisting, in great part, of elaborate trifling about compounds of little practical importance, but rejoicing in names of fearful length, and formulæ of excruciating complexity--and in fact treating this branch of chemical science as altogether of second-rate importance in comparison with Mineral Chemistry. Now the importance of this last-mentioned branch of chemistry, which includes the description of the Metals and their Compounds, is of course beyond all question; but it is perhaps not too much to say that at least an equal value in a practical point of view may be ascribed to that department of the science which is concerned with the materials of our food and clothing, and with the constitution of the compounds which make up the bodies of plants and animals. To remove any doubt that may yet exist as to the practical importance of Organic Chemistry, we can imagine nothing more effectual than a perusal of the volume under consideration, the appearance of which will doubtless be hailed with pleasure by all who are interested in the subjects of which it treats. H. WATTS

OUR BOOK SHELF

Acoustics, Light, and Heat. By Thomas W. Piper. (London: George Philip and Son, 1881.)

THIS little work is not without its merits, the descriptions of the simpler phenomena and laws of these branches of physics being for the most part clear, accurate, and couched in easy language. The arrangement adopted in the chapters of the book is a departure, and we think not a very wise one, from the usual order of subjects in elementary text-books of physics. After a preliminary chapter on the atmosphere, its elasticity and its weight, the author plunges into vibratory motion, and under this head treats of acoustics. Chapter III. is on rectilinear motion, under which heading we have the following subjects:—The reflection of sound, the linear propagation of light, reflection of light and its applications, convection, radiation, and conduction of heat, laws of curved mirrors, laws of refraction, lenses, magic lantern, refraction of sound, spherical aberration of lenses, and, lastly, properties of matter. We have quoted these in the order in which they occur, and cannot help thinking that, however clearly the individual subjects are treated of, this heterogeneous lumping together of them must hamper the comprehension of beginners. Chapter IV. deals with the conservation of matter, including expansion by heat; Chapter V. is on thermometers. Chapter VI., on the conservation of energy, is another example of the author's peculiar method. It begins with the correlation of forces, deals with the prismatic spectrum, diathermancy, acoustic resonance, the laws of vibrations of strings, and specific heat. The book concludes with a chapter on sensation, optical and acoustical. Except for these aberrations of arrangement, and for one or two slips, the book would be a satisfactory one for beginners in natural philosophy.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

The Parasitic Habits of Molothrus

IN the "Origin of Species" I adopted the view maintained by some writers, that the cuckoo lays her eggs in other birds' nests, owing to her habit of laying them at intervals of two or three days; for it could hardly fail to be disadvantageous to her, more especially as she has to migrate at a very early period, to have young birds of different ages and eggs all together in the same nest. Nevertheless this occurs with the non-parasitic North American cuckoo. If it had not been for this latter case, it might have been argued that the habit of the common cuckoo to lay her eggs at much longer intervals of time than do most other birds, was an adaptation to give her time to search for foster-parents. The Rhea or South American ostrich is believed likewise to lay her eggs at intervals of two or three days, and several hens deposit their eggs in the same nest on which the male sits; so that one hen may almost be said to be parasitic on another hen. These facts formerly made me very curious to learn how the several species of Molothrus, which are parasitic on other birds in very varying degrees, laid their eggs; and I have just received a letter from Mr. W. Nation, dated Lima, September 22, 1881, giving me information on this head. He says that he has there kept in confinement for a long time *Molothrus perpurascens*, and has likewise observed its habits in a state of nature. It is a resident species of Western Peru, and lays its eggs exclusively in the nests of a sparrow (*Zonotrichia*), starling (*Sturnella bellicosa*), and a pipit (*Ænthus chii*). He then proceeds: "The eggs of the sparrow are very much like those of the Molothrus in size and colour. The eggs of the starling are larger and somewhat different in colour; while the eggs of the pipit are very different both in size and colour. Generally one egg of the Molothrus is found in a nest, but I have found as many as six. The young Molothrus does not always eject its foster-brothers; for I have seen a young one nearly fully feathered in a nest with two young

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